http://ac0c.com/main/page_homebrew_sb200_tank_mods.html

SB-200 Sleeper Tank Mods

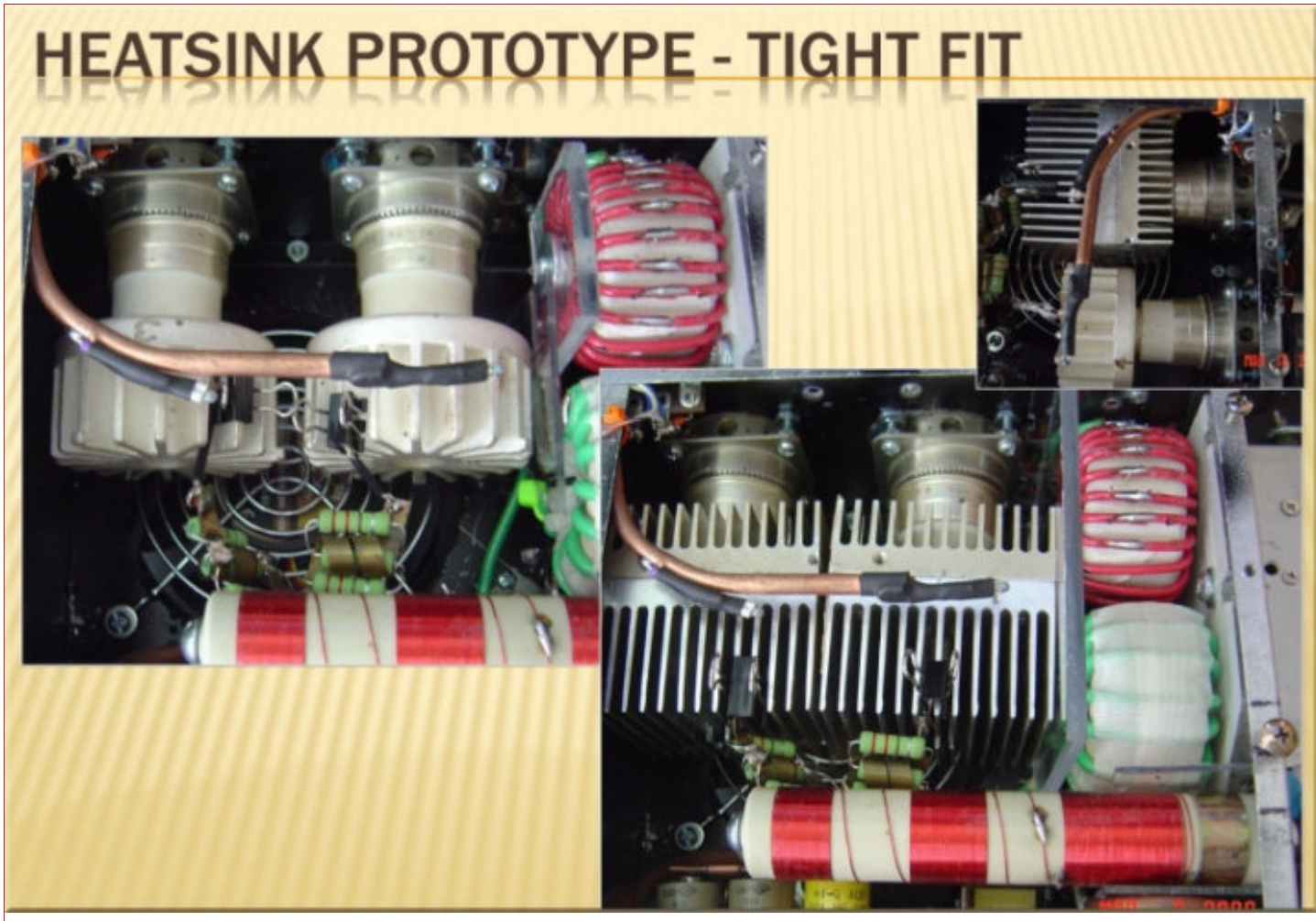
SB 200 mods rebuild AC0C_com

A Quick Overhaul to the SB-200 Tank Circuit

LINK: See the original work on the SB-200 conversion - in complete detail - HERE

With the WPX RTTY contest coming up, I thought it was time to look into the tank on this amp especially since I've been pushing my luck for a while now...

The tank was originally built around the stock Gi7b round-shaped spreaders (from an earlier photo, below, left). I had done a lot of thermal profile work on the spreader to see what bigger spreaders would do – but I had not considered the HUGE impact the big spreaders and their big stray cap would do. You know how that first amp build goes. Just happy the thing ticks and does not (often) explode.



After getting a couple of iterations of spreaders built, I knew the tank was thrown way off on the higher bands. But this was a couple of years ago and 20m was the only usable higher band. Things have changed now and my prior patch of just dropping the tank's L with some shorting here and there on coils was coming back to haunt me. Very high Q, and with that a lot of dissipation both in the tank and probably in the tubes as well.

Another problem with the original design was that the 40m coil shared turns with the 80m toroid. This is a definite no-no. Running on 40m – you could smell that blasted thing cooking. Hot enough to burn to ash the 3M high-voltage yellow tape I had used...

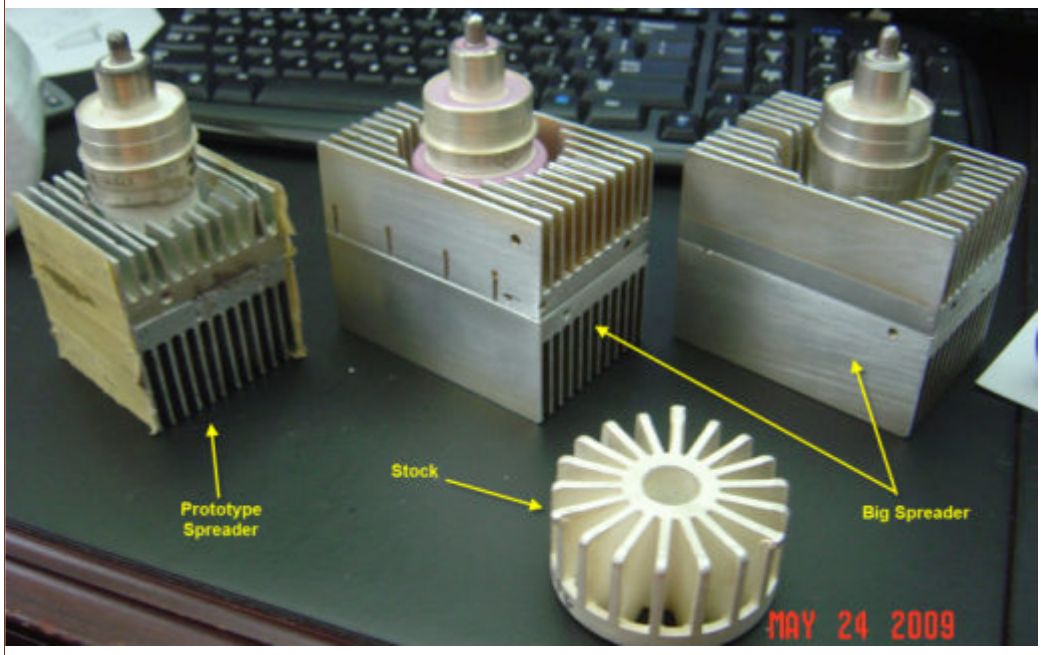
And lastly the band-switch is in need of replacing as well – and I have the wafers on the shelf. But swapping them is more of a task than I wanted to take on right now. The band-switch has not complained in the last 2 rtty contests so I will keep praying and try to avoid any bad tuning practices. Leaving that project for another day.

So I thought it would be easy to patch these things up. Unfortunately, after measuring the spreader cap contribution, the big ones I made were probably not going to be workable – at least on 15m. And LTspice was not giving me any encouragement that the series L was the actual and workable fix... Then again, my LTspice skill is nearly zero.

The first executive decision was to ax 10m, 80m and 160m. This amp is now only used with a So2r position which is antenna option limited to 40/20/15. That simplifies the tank work a lot both in band permutations and in working space (things are damn tight in there).

For the cap issue, the huge spreaders were clearly an issue. Fortunately I had some prototype spreaders (photo above, left) in the junkbox which were about 75% the size of the final big-sized version that I wanted originally to use. They were also a 2-part construction. So I pulled the top half off and checked the mounted capacitance. The "stock" spreader runs about 9 pf per tube (mounted in the amp). And the 1/2 sized prototype spreaders were running about 15 pf each. Compare that to 32-37 per spreader of the big size.

Given the op mode here is RTTY and Pd is an issue, I did not want to revert to the stock spreaders (the air flow is wrong for those to work well) – and was really was hoping that these half-sized prototype spreaders would give enough Cin relief... I think they are big enough to do the heat transfer job. But they sure are small compared to the "big boys" I had hoped to use...



I used the original set of cores and spread the 40m tank over the two sets. Each set is a stack of T200-2. About 2 uH per core for a bit over 4.2 uH. I'm not sure if putting the two cores in series (vs just adding more turns to a single core) helps but it was easy to do.

Next I got to thinking that the series L idea must be workable in reality – and that my spice work must be wrong (or incomplete). I had a 0.55 uH on hand and put that in series between the suppressors and the coupling cap. I needed later, I could just tack a solder bridge short on the coil to lower the value. Since LTspice was not giving me any advice, I started there.

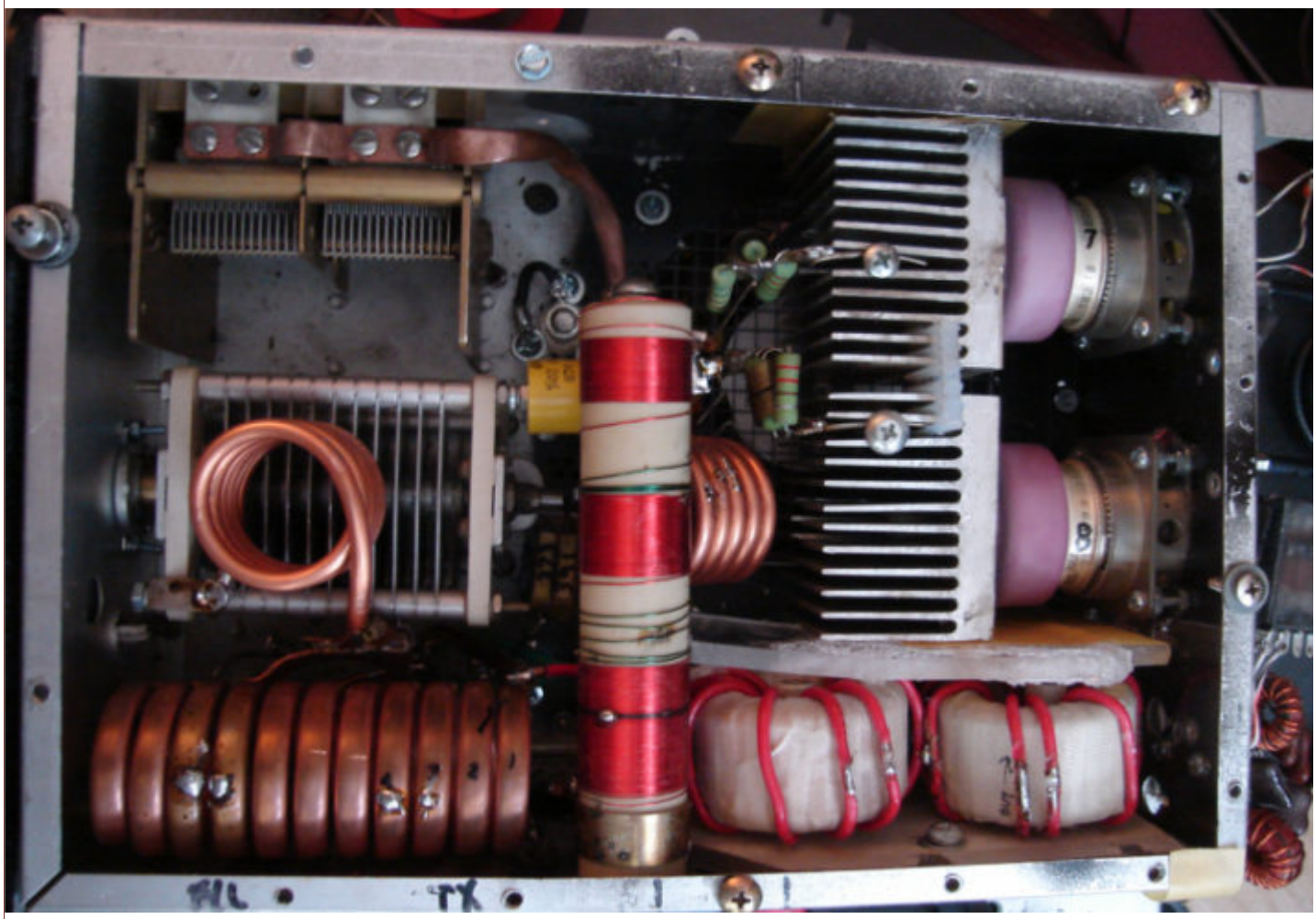
The original 10m coil had a lot of surface area parallel to the case and I pulled that out. And then tested the 3 bands to see if the tune point on both caps into the DL was within rotation limits. Very good so far.

Then I wound another coil to add more L to the tank. The more L relative to C, the lower the Q is going to be – and in the best case it's going to be above 10 on 15m no matter what I did. So I added L until I was more or less at the min cap value on the tune cap on 15m.

Lastly, the Gi7b were swapped with a fresh set of Gi7bT - the "tropical service" version of the tube. The "T" version has the same specs as the "b" version, but it has a larger body surface area and I think that must mean

lower operating temps for the body and by extension, a lower socket temp. All good things...

The final tank revision and tube heatsink arrangement is shown below.



Another check of the amp at full drive levels had the controls (other than tune on 15m) away from the stop. And efficiency at 61% 40m, 62% on 20m and 57% on 15m. This is a big step up from 45%/55%/50% level before the change. And that shows the amp running around 1KW out while staying within the official plate dissipation limits (700w).

Item	40M	20M	15M
Power In	51w	50w	51w
Power Out	970w	990w	982w
Plate current - Ip	0.560A	0.560A	0.605A
Plate voltage - B+	2700V	2700V	2680V

Grid indication	400	410	400
Power input Pin	1512w	1512w	1621w
Plate dissipation Pd	592w	572w	689w
Efficiency	60.8%	62.2%	57.4%

While this change does not address all the pending issues, it's clearly "good enough" for now...